

Post-Delisting Monitoring Plan for Nine Distinct Population Segments of the Humpback Whale (*Megaptera novaeangliae*)

DRAFT



March 2016

U.S. Department of Commerce |National Oceanic and Atmospheric Administration |NOAA Fisheries

Address questions about the monitoring plan to:

National Marine Fisheries Service, Office of Protected Resources, 1315 East-West Highway,
Silver Spring, MD 20910

Recommended Citation:

National Marine Fisheries Service. 2016. Post-Delisting Monitoring Plan for Nine Distinct Population Segments of the Humpback Whale (*Megaptera novaeangliae*) - DRAFT. National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD. 25 pp. + Appendices.

Cover photo: Humpback whale breaching in the Bay of Fundy, Canada
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I. BACKGROUND AND INTRODUCTION

This document provides a plan for monitoring the ten Distinct Population Segments (DPSs) of the humpback whale (*Megaptera novaeangliae*) that we did not propose to list as threatened or endangered under the Endangered Species Act (ESA) when we proposed to revise the status of the humpback whale (80 FR 22304, April 21, 2015). NMFS has developed this draft plan and is soliciting public comment on it, and we will finalize it to coincide with publication of a final rule to revise the listing status of the humpback whale. Statutory requirements for monitoring species that are no longer listed under the ESA are described below in Section C.

A. Listing History

The humpback whale was listed as endangered in 1970 under the Endangered Species Conservation Act of 1969, the precursor to the ESA. When the ESA was enacted in 1973, the humpback whale was transferred to the List of Endangered and Threatened Wildlife, retaining endangered status, and, because of its endangered ESA status, was considered “depleted” under the Marine Mammal Protection Act (MMPA). NMFS issued a recovery plan for the humpback whale in 1991, and its long-term numerical goal was to increase humpback whale populations to at least 60 percent of the number of whales existing before commercial exploitation or 60 percent of current environmental carrying capacity. The recovery team recognized that those levels could not then be determined, so in the meantime, the interim goal of the recovery plan was to double the population size of extant populations within the next 20 years (http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_humpback.pdf). In fact, the historical size of humpback whale populations continues to be uncertain (Ruegg *et al.*, 2013, and references therein; Bettridge *et al.*, 2015).

B. Humpback Whale Protection and Monitoring under the MMPA and other Laws

MMPA

In the United States, all marine mammals, including humpback whales, are protected under the Marine Mammal Protection Act (MMPA) when they occur in waters under U.S. jurisdiction and protected from U.S. citizens and U.S. vessels on the high seas. Therefore, all members of the humpback whale species will continue to be protected under the MMPA even if the particular DPS to which they belong is not included on the ESA’s List of Endangered and Threatened Wildlife. The MMPA established a moratorium on the taking (i.e., to harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect) of marine mammals with certain exceptions (e.g., taking incidental to certain activities). Under the MMPA, humpback whales are currently classified as a strategic stock and designated as depleted throughout their range because of their endangered status under the ESA. Though the DPSs of humpback whales not proposed for listing under the ESA may lose their “depleted” status under the MMPA as a result of the change in ESA listing status, the fundamental MMPA protections and evaluation requirements common to all marine mammals would remain in effect.

NMFS is required under section 117 of the MMPA to update Marine Mammal Stock Assessment Reports (SARs) annually for strategic stocks, and triennially for non-strategic stocks. SARs contain reviews of the population status and trend in abundance, estimate mortality and serious injury rates due to anthropogenic causes, and describe other factors that may affect stock status (NMFS 2005). Thus, estimates of humpback whale population abundance and trends, as well as

anthropogenic-caused mortality and serious injury rates, must be made at least triennially independent of any monitoring requirements that may apply under Section 4(g)(1) of the ESA, for humpback whales in U.S. waters. It is important to note, however, that the designation of MMPA humpback whale stocks do not necessarily coincide with those of humpback whale DPSs under the ESA. While the Central North Pacific, Western North Pacific, and Gulf of Maine stocks coincide with the Hawaii, Western North Pacific, and West Indies DPSs, respectively, the California-Oregon-Washington stock represents whales from the Central America, Mexico, and even Hawaii DPSs, and the American Samoa stock represents only a small portion of the Oceania DPS. In light of the revision to the humpback whale listing, MMPA stock boundaries may be revisited.

Under Section 101 of the MMPA, Congress directed NMFS to authorize the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing, which follows a separate process) within a specified geographic region. Before issuing such authorizations, NMFS must make specific findings regarding the potential impacts of the action (e.g., the takings must have a negligible impact on the species and must not have an unmitigable adverse impact on the availability of the species for subsistence), set forth measures to ensure that the taking has the least practicable adverse impact on the species and its habitat, set forth monitoring and reporting requirements, and, in the case of activities that may affect the availability of a species for taking by subsistence users, include peer review of proposed monitoring plans. Thus, in those cases where persons who engage in activities that may take humpback whales (e.g., oil exploration) apply for incidental take authorizations, the MMPA permitting process provides a mechanism for NMFS to evaluate and to monitor the impacts occurring from such activities. NMFS anticipates that these kinds of activities will occur throughout the U.S. range of the humpback whale and that there will continue to be applications and authorizations of incidental take for U.S. citizens and corporations with related evaluation, monitoring, and reporting. Additionally, NMFS requires evaluation, monitoring, and reporting related to humpback whale research activities via its permitting and funding of research.

Section 118 of the MMPA governs the taking of marine mammals incidental to commercial fishing operations. The goal of this section was to reduce the incidental mortality or serious injury of marine mammals occurring in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate within 7 years after its enactment. There are registration and reporting requirements related to these activities. Under section 118, Take Reduction Teams (TRTs) address non-strategic stocks in Category 1 fisheries. Currently humpback whales are included under the Atlantic Large Whale Take Reduction Plan (ALWTRP) and the Pacific Offshore Take Reduction Plan (POCTRP).

ALWTRP

The ALWTRP was developed in consultation with the Atlantic Large Whale Take Reduction Team (ALWTRT), which is a stakeholder team consisting of fishing industry representatives, scientists, environmental advocates, state and federal officials, and other interested parties. The ALWTRP has several components, including restrictions on where and how fishing gear can be set, research on whale populations and behavior, research on fishing gear interactions and modifications, and outreach to inform and collaborate with fishermen and other stakeholders. In August 2012, staff of the NMFS Greater Atlantic Regional Fisheries Office (GARFO) completed

a monitoring strategy for the ALWTRP (available online at: http://www.greateratlantic.fisheries.noaa.gov/whaletrp/reports/5a_ALWTRP%20Monitoring%20Strategy.pdf). The strategy incorporates a variety of measures that will assist in evaluating levels of compliance and overall effectiveness of the take reduction plan:

- Biological, oceanographic, and fishing gear analyses – population growth trends, large whale serious injury and mortality determinations, observed entanglement events over time, entangling gear identification, and oceanic conditions/trends related to large whales;
- Fishing industry practices and compliance indicators – utilizing observer data, quantifying enforcement efforts, gear characterization efforts; and
- Education/outreach measures – distribution of outreach guides and other information, issuing permit holder letters, ALWTRP website maintenance, trade-show participation, industry outreach meetings, ALWTRP trainings, direct communications, and publication of an annual compliance and effectiveness report.

POCTRP

In September 2013, NMFS completed a monitoring strategy for the POCTRP. The POCTRP was implemented in 1997 through regulation and requires fishermen participating in the California large mesh drift gillnet fishery to, among other requirements, use pingers (acoustic deterrent devices) and lower their nets to a minimum depth to reduce the incidental mortality and serious injury of strategic stocks, including sperm whales and humpback whales. Participation in this fishery has been reduced to fewer than 20 vessels, and effort is generally concentrated off Southern California due to a closure to protect leatherback turtles in northern California. The fishery is currently being monitored by trained observers at approximately 20 to 30 percent, and the distinguishing characteristics of the gear (e.g., 18-20 inch mesh, floats) generally allows for identification of this fishery associated with a reported entangled whale. Based on information gathered from observers, nearly 100% of the fleet that is observed is compliant with the POCTRP regulations. That said, it is not possible to provide observers on approximately one-third of the fleet due to safety concerns or size of the vessel, which means that bycatch may be underreported for these fisheries. Since 2015, vessels participating in this fishery are required to use a vessel monitoring system, which has helped enforcement agencies track unobservable vessels and potentially target those vessels for at-sea boardings. The POCTRP monitoring strategy incorporates a variety of measures that assist in evaluating compliance levels and overall plan effectiveness:

- Biological measures – determining abundance estimates, mortality estimates, potential biological removal (PBR), and zero mortality rate goal (ZMRG) and evaluating observer information (locations and timing of observed takes, percentage of coverage);
- Compliance measures – evaluating observer information (extender¹ length, pingers, bycatch), captain's logbook data (bycatch), enforcement data (boardings, warnings/violations issued);
- Research – evaluating results from biological and/or gear research in support of the POCTRP; and

¹ An extender is a line that attaches a buoy (float) to a drift gillnet's floatline. The floatline is attached to the top of the drift gillnet. Since floatlines are attached at the top of drift gillnets, the length of extender lines determine the depth in the water column at which the net is fished.

- Education/outreach measures – distributing compliance guides and laminated placards, annual serious injury and mortality reports sent to the POCTRT, maintaining and updating the POCTRP training material presented at skipper workshops, and maintaining the POCTRP website.

Other U.S. and state regulations and guidelines

Numerous U.S. and state regulations and guidelines address impacts from whale watching activities. Currently NMFS approach regulations exist in Hawaii and Alaska to protect humpback whales from vessels by prohibiting vessels from approaching within 100 yards of a humpback whale. 50 CFR § 224.103(a); 224.103(b). In Alaska, this regulation also requires vessels to maintain a slow, safe speed near humpback whales, and prohibits vessels from intercepting oncoming whales (a practice also known as “leap-frogging”). In Hawaii, this regulation includes a prohibition on aircraft within 1,000 feet of a humpback whale. If the proposed rule to revise the status of humpback whales goes final, the Alaska approach regulation will need to be moved to the part of the Code of Federal Regulations containing regulations for the protection of threatened species (50 CFR Part 223), to reflect that no DPSs will be endangered. Because the Alaska regulation was adopted under authority of both the MMPA and the ESA, the regulation also will be set out with MMPA regulations (50 CFR Part 216). The Hawaii approach regulation will cease to have effect because the Hawaii DPS will not be listed under the ESA. The Hawaiian Islands Humpback Whale National Marine Sanctuary has similar approach regulations. These regulations provide some protection for individual humpback whales in the Hawaii DPS while they are in their breeding areas and to individual humpback whales in the Hawaii and Mexico DPSs while in their feeding areas. Stellwagen Bank and Gulf of the Farallones National Marine Sanctuaries have whale approach guidelines that provide some protection individuals from the West Indies and Mexico DPSs, respectively, while they are in their feeding areas. NMFS has issued whale watching guidelines for the Gulf of Maine for whale-watching tours. Glacier Bay National Park and Preserve (GBNPP) regulations (36 CFR 13, subpart N) prohibit: operating a vessel within ¼ nautical mile of a whale, except for commercial fishing vessels actively trolling, setting, or pulling long lines, or setting or pulling crab pots; and, in designated whale waters, operating a motor vessel (\geq 18 feet in length) less than 1 nautical mile from shore, or in narrower areas navigating outside of mid-channel, except vessels actively engaged in fishing or operating under sail. GBNPP regulations also set speed limits and total number of vessels per season in designated whale waters. Hawaii also has regulations to protect humpback whales within state waters (Hawaiian Administrative Rules (HAR) § 13-244-40 (approach regulations), and HAR § 13-256-16 and 19 (thrill craft and parasail vessel prohibitions off South and West Maui)). In addition, Whale SENSE, a voluntary program promoting responsible viewing to minimize disturbance and protect whales from harassment, currently exists in New England, the mid-Atlantic, and Alaska. The program is expected to be adopted in California in the near future.

With regard to whale-watching impacts outside of U.S. waters, Mexican Standard 131 includes avoidance distances and speeds, limits on the number of boats, and protection from noise (echo sounders are prohibited). In the geographic area of the Brazil DPS, most whale-watching occurs in Abrolhos National Park, which is highly controlled, with a maximum number of boats of 15. South Africa has whale-watching regulations that help protect humpback whales from the Gabon/Northwest Africa and Southeast Africa/Madagascar DPSs. Further protection for the

Southeast Africa/Madagascar DPS is provided by a voluntary code of conduct for operators in waters off Mozambique (though this is poorly upheld, with no formal regulations or enforcement) and recently developed guidelines for protection off Madagascar, which were passed as law in 2000. The East Australia DPS enjoys protection from whale-watching impacts through the whale-watching management program in Queensland, including whale and dolphin regulations for the Great Barrier Reef (<http://www.gbrmpa.gov.au/about-us/legislation-regulations-and-policies/whale-and-dolphin-watching-regulations>), as well as national whale-watching guidelines. For the Oceania DPS, New Zealand has marine mammal protection regulations (<http://www.legislation.govt.nz/regulation/public/1992/0322/latest/whole.html#DLM168839>), and Tonga and New Caledonia have whale-watching guidelines; in 2008, tour operators in New Caledonia signed a voluntary code of conduct that has significantly reduced the level of daily exposure to boats.

International laws and guidelines

The International Whaling Commission (IWC) was set up under the International Convention for the Regulation of Whaling (ICRW), signed in 1946. The IWC established an international moratorium on commercial whaling for all large whale species in 1982, which took effect in 1986 and affected all member (signatory) nations (paragraph 10e, IWC 2009a). Part of the IWC's function is to set catch limits for commercial whaling. These have been set at zero since 1985. Since that time, the IWC's Scientific Committee has developed a stock assessment and catch limit methodology called the "revised management procedure," with the goal of providing information on catch limits consistent with maintaining sustainable populations. As of 2014, the IWC has maintained the zero catch limit for commercial whaling, which is a policy that has engendered considerable debate within the organization. The ICRW provides a process by which countries may object to specific provisions, and Norway and Iceland currently allow commercial whaling based on an objection and a reservation, respectively, to these catch limits. The IWC also develops catch limits for aboriginal subsistence whaling, including take of humpback whales in coastal areas of Greenland and the West Indies. The ICRW allows for signatory nations to harvest whales for scientific purposes through their own national permit process, although humpback whales have not been reported to have been taken under this process. However, unreported commercial whaling is not without precedent (Yablokov 1994, Ivaschenko et al. 2015).

The IWC has been involved in the comprehensive assessment of humpback whales in the Southern Hemisphere since 1991, bringing together available information on distribution, migration, abundance, past exploitation and population (stock) structure.

The IWC's Conservation Committee was established to consider a number of emerging cetacean conservation issues, and its role continues to evolve. The Conservation Committee collaborates closely with the IWC's Scientific Committee to understand and address a range of threats to whales and their habitats.

The varied work program includes:

- A strategy to provide an international forum for advice and support to the fast-growing whalewatching industry, including development of an online and 'live' whalewatch handbook.
- A ship strikes program that has developed a publicly accessible database, now being used to gather data and build understanding of where and why collisions occur between whales and ships. The ultimate aim is to develop targeted and practical mitigation measures.
- Development of the Conservation Management Plan concept, a flexible, collaborative blueprint for effective coordination of conservation work between local, national, regional and international stakeholders. Three Conservation Management Plans have already been instigated for some of the most at-risk whale populations and more are under consideration.
- A joint program with the Scientific Committee to consider the impact of marine debris on cetaceans. Two workshops have been held, reviewing existing research upon which a series of recommended actions were developed and endorsed by the IWC.

The IWC's Conservation Committee provides a forum for members of the IWC to report and share information on the measures being taken within their own countries to reduce and record incidences of ship strikes. In addition, the Conservation Committee has established a dedicated Ship Strikes Working Group to develop detailed proposals for mitigation of ship strike events and to co-ordinate work between member governments (<https://iwc.int/ship-strikes>). In 2010, the IWC's Ship Strikes Working Group held a joint workshop with scientists and representatives from ACCOBAMS (the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area), which reviewed the available information on ship strikes including mitigation measures for reducing ship strikes. It developed a number of important recommendations and these form the basis of the IWC's work plan to address this important issue.

Every year, the IWC's Scientific Committee considers methods of estimating the number of whales killed from ship strikes. The IWC is working in conjunction with other organizations such as the International Maritime Organization and has produced an information leaflet with further advice to reduce the risk of collision.

Many countries have regional or national strandings networks that maintain records of all stranded cetaceans and where possible ensure that sufficient data are collected to ascertain cause of death. In recognition that ship strikes are one of the reasons for cetacean strandings, a list of cetacean stranding networks updated through April 2011 is provided at <https://iwc.int/index.php?cID=873&cType=document>.

The IWC is working with a group of international experts to build a global network of professionally trained and equipped entanglement responders. The program began in autumn 2011. The first training workshop was held in March 2012. Since then it has reached more than 500 scientists, conservationists and government representatives from over 20 countries.

Two Sanctuaries are currently designated by the IWC, both of which prohibit commercial whaling. The first of these, the Indian Ocean Sanctuary, was established in 1979 and covers the whole of the Indian Ocean south to 55°S. The second was adopted in 1994 and covers the waters of the Southern Ocean around Antarctica.

The IWC is working with scientists, governments, NGOs and the whalewatching industry, to assess threats, identify and share best practice, and support responsible, sustainable whalewatching. The IWC Scientific Committee is studying the potential impact of repeated whalewatching on individual whales, their populations and their habitats. This ongoing research has led the IWC to develop principles and guidelines for whalewatching which have helped guide the development of whalewatching regulations around the world (<https://iwc.int/wwguidelines>). Measures introduced include limits on vessel numbers, speeds, approach distances and time spent with whales, and a variety of training and permit schemes. Over fifty countries have produced national guidelines or regulations for whalewatching. The IWC Whalewatching Working Group has produced a five-year whale watching strategy that has been adopted by the Commission (https://iwc.int/private/downloads/ZibAR4HShR6wjYdH9C8NRw/AC-002s3%20IWC%20Whale%20Booklet_HR.pdf), and is developing a Handbook for Whale Watching. This will be a web-based, living and evolving tool. It will support whalewatching operators, national and regional regulators, and others involved in the sector, to ensure whalewatching is sustainable now, and as it develops into the future.

In Canada, the North Pacific population of humpback whales is listed as threatened under the Species At Risk Act (SARA) (http://www.sararegistry.gc.ca/approach/act/default_e.cfm), so it is illegal to kill, harass, capture or harm it in any way. Critical habitat has been identified to the extent possible off Langara Island, southeast Moresby Island, Gil Island and southwest Vancouver Island (Figures 3 and 4). These areas support feeding and foraging, and resting and socializing, and they are protected from destruction. A recovery strategy under SARA was published in 2013 (Fisheries and Oceans Canada 2013). The two goals of this recovery strategy are: in the short term, to maintain at minimum, the current abundance of humpbacks in B.C. (Using best estimate of 2,145 animals (95% confidence limits 1,970 - 2,331 as presented in Ford *et al.* 2009)); and in the longer-term, to observe continued growth of the population and expansion into suitable habitats throughout B.C. To meet these goals, threat and population monitoring, research, management, protection and enforcement, stewardship, outreach and education activities are recommended. Based on the need to assess population-level effects of threats and develop appropriate mitigation measures, activities to monitor and assess threats are given higher priority. An action plan to implement this recovery strategy will be completed within five years of final posting of this recovery strategy on the SAR Public Registry.

Humpback whales are also conserved and managed under authority of Canada's Fisheries Act (1985) and subsequent Marine Mammal Regulations (MMR 2011; available at: <http://lawslois.justice.gc.ca/eng/regulations/SOR-93-56/index.html>). Except for people of First Nations, the MMR prohibits fishing for, or disturbance of, any marine mammal except as may be permitted by license.

C. Monitoring Requirements under the ESA

Section 4(g)(1) of the ESA requires that NMFS:

“...implement a system in cooperation with the States to monitor effectively for not less than five years the status of all species which have recovered to the point at which the measures provided pursuant to this Act [the ESA] are no longer necessary....”

General guidance for monitoring plan development is provided by recommendations jointly developed by the U.S. Fish and Wildlife Service and NMFS (USFWS and NMFS 2008). This Post-Delisting Monitoring Plan (PDMP) guidance clarified that:

“The primary goal of PDM is to monitor the species to ensure the status does not deteriorate, and if a substantial decline in the species...or an increase in threats is detected, to take measures to halt the decline so that re-proposing it as a threatened or endangered species is not needed.”

The PDMP guidance also indicated that:

“Each PDM plan should provide a species-specific discussion of the circumstances that would trigger termination of PDM, intensification of PDM, initiation of a new status review, or emergency listing... Such decisions often require consideration and interpretation of multiple factors, including changes in threats and/or demographic trends. Therefore, this section of the PDM plan may not be limited to quantitative criteria, but also includes qualitative considerations (such as indicators of changing threats) and guidance on how demographic data should be interpreted (for example, to separate a decline in productivity due to a recurring or new threat versus a decline due to expected effects of density-dependence). The narrative may also include guidance on how multifaceted PDM results might be integrated to support biologically sound decision making. In most cases, specification of these triggers or thresholds will be based on information and decision-making processes documented during the recovery planning and delisting processes.”

“For species subject to natural cyclic trends or substantial environmental variation, the expected range and frequency of variation should have been well-documented during the recovery period and appropriately considered in the PDM plan. If a species may approach carrying capacity in some or all parts of its range during the PDM period, then biologists must anticipate the possibility that density-dependent factors may trigger declines in productivity and/or survival and provide measures to distinguish these from signals that the species is exhibiting a bonafide decline in its probability of persistence.”

Information and recommendations specific to the humpback whale are also provided in the Humpback Whale Recovery Plan (NMFS 1991). Further, in 2005, a North American Conservation Action Plan (NACAP) was developed for humpback whales under the 1994 mandate of the North American Agreement for Environmental Cooperation. Through the Commission for Environmental Cooperation, researchers and species managers in Mexico, Canada and the US jointly developed the NACAP, which identifies threats monitoring and prevention (incl. ship strikes, entanglement, acoustic and ecotourism impacts) as a priority.

Although our determination that certain DPSs of humpback whale no longer qualify for listing is not technically a “delisting,” for the reasons explained in the proposed listing rule, we find that it is appropriate to monitor the status of the populations that will no longer be listed if the proposed rule is finalized. This is consistent with the intent of Section 4(g)(1) of the Act. 16 U.S.C. 1533(g)(1). The PDMP guidance thus guides us in our development of a monitoring plan for those humpback whale DPSs.

NMFS developed this draft humpback whale monitoring plan in cooperation with the representatives from the Alaska Department of Fish and Game, Hawaii Department of Land and Natural Resources, and Massachusetts Division of Marine Fisheries, the Hawaiian Islands Humpback Whale National Marine Sanctuary, and Glacier Bay National Park and Reserve. NMFS is soliciting input from the public, other concerned governments and agencies, Indian tribal governments, Alaska Native tribal governments and organizations, the scientific community, industry, and any other interested parties, and seeking peer review of this draft plan during a 30-day comment period. The Federal Register notice and other documents related to revising the humpback whale listing are posted on the NMFS web page: (<http://www.fisheries.noaa.gov/pr/species/mammals/whales/humpback-whale.html>).

NMFS is responsible for the successful implementation of this monitoring plan and for ensuring its adequacy under the ESA. NMFS, in cooperation with States, other federal agencies, foreign governments, non-governmental organizations, Indian tribal governments, Alaska Native tribal governments or organizations, and other partners, will monitor the humpback whale DPSs that are not listed as endangered or threatened for 10 years after making a final determination on the proposed rule to revise the listing status of the humpback whale (80 FR 22304, April 21, 2015) by maintaining existing monitoring programs and expanding the effort where needed and as possible to address concerns specific to this PDMP.

II. OBJECTIVES

In keeping with the broad goals discussed in the PDMP guidance (USFWS and NMFS 2008), the Humpback Whale Recovery Plan (NMFS 1991), and issues raised in the Status Review (NMFS 2015), this draft PDMP has three primary goals:

- Monitor the DPSs to detect changes in trends in production of calves and adult/juvenile abundance and population growth rates, and distinguish if changes are a threat to the DPS or a signal that the DPS is approaching or has surpassed the DPS's carrying capacity;
- Monitor the DPSs to detect changes in spatial and temporal distribution of different age classes;
- Monitor residual or emerging threats, and identify new threats that could affect the sustainability of the recovery of the humpback whale DPSs.

With regard to the monitoring of population status and threats, the monitoring must allow NMFS to detect any problems or issues related to the three goals listed above, and, if necessary, to take action so that listing the DPSs as threatened or endangered is not needed (USFWS and NMFS 2008). Such action could be in the form of intensified PDM. The monitoring must also provide NMFS with the information needed to determine when it is appropriate to initiate a new status review or list a DPS on an emergency basis. On the other hand, the monitoring must also provide NMFS with enough information to determine that a DPS is healthy or has reached carrying capacity, and therefore, it may be appropriate to terminate PDM.

Population abundance and growth rate estimates differ in quality for different humpback whale DPSs. Acquiring these types of new data depends on whale surveys, which are infrequent. Take Reduction Teams, entanglement response efforts, and stranding networks provide important data for monitoring threats. NMFS will promote efforts to acquire these data on the breeding and

feeding grounds and examine trends and threats for each of the DPSs as data become available to determine: 1) whether calf production, population abundance, and population growth rates continue to increase or appear to level off; 2) whether spatial or temporal distribution of whales changes; and 3) the extent to which threats such as fishing gear entanglement, vessel strikes, disease, parasites, contaminants, biotoxins, direct take (e.g. whaling, subsistence harvest), declines in abundance of important prey, habitat degradation, whale watching, underwater noise, disturbance, tourism, predation, research, and climate change and ocean acidification are affecting different humpback whale DPSs. In addition to the data collected through these avenues, NMFS will be examining the monitoring data available to inform PDM efforts, as provided by various cooperating humpback whale research entities. NMFS will analyze these after each breeding season (winter) monitoring effort. If necessary, NMFS will propose adjustments to the sampling design to ensure comparability of the data over area and time. NMFS may request information from Canada, Mexico, and other countries within the range of these humpback whale DPSs to obtain information on humpback whales off the coasts of other countries.

The population monitoring component of this draft PDMP is designed to detect changes in abundance and population growth rate of the different humpback whale DPSs that might arise from a variety of threats including fishing gear entanglement, vessel strikes, disease, parasites, contaminants, biotoxins, direct take (e.g. whaling, subsistence harvest), declines in abundance of important prey, habitat degradation, whale watching, underwater noise, disturbance, tourism, predation, research, and climate change and ocean acidification. While Section 4 of the ESA requires monitoring for not less than five years following removal of species from the List of Endangered and Threatened Wildlife due to recovery, based on the species' longevity, relatively long calving intervals, and time to maturity, NMFS recommends that monitoring occur for 10 years to ensure that humpback whale DPSs that will not be listed under the ESA remain in a recovered state. This recommended period is necessary in part because of the biology of this long-lived, late maturing species and the difficulty in obtaining data on a regular basis to detect changes in population abundance and trends.

If these data or other substantial information indicate that any humpback whale DPS not proposed for listing is experiencing decreases in calf production, juvenile and adult abundance, population growth rate, or distribution that are cause for concern, or that any existing or emerging threat seems to be negatively affecting production, abundance, population growth rate, or distribution, NMFS will convene a team of experts to decide whether PDM should be extended or more intensive review or studies should be initiated to determine the cause or provide more details on the mechanisms, and to determine whether to initiate a status review or recommend to the Secretary that the DPS be listed on an emergency basis. Similarly, if these data or other substantial information indicate that the DPS seems to be exhibiting growth rates and other population parameters indicative of a healthy population or one that is approaching carrying capacity, NMFS will convene a team of experts to determine if ending PDM is appropriate, though PDM will continue for at least 5 years. Because information on calf production, abundance, growth rate, and distribution of different DPSs may not be easy to obtain on a regular basis, it is expected that this monitoring plan will rely heavily on threat monitoring (entanglement and ship strike data, MMPA take permits, unusual mortality events, federal actions occurring in humpback whale habitat, effects of ocean acidification, etc.).

III. IMPLEMENTATION

NMFS has the lead for planning, coordinating, and implementing this monitoring effort. A NMFS PDMP working group comprised of the National ESA Listing Coordinator, the National Recovery Planning Coordinator, staff from the Alaska, Pacific Islands, West Coast, and Greater Atlantic regions, the Alaska Fisheries Science Center (AFSC), Alaska Department of Fish and Game, Hawaii Department of Land and Natural Resources, Massachusetts Division of Marine Fisheries, Glacier Bay National Park and Preserve, and Hawaiian Islands Humpback Whale National Marine Sanctuary was established to develop this draft monitoring plan (Appendix A). The Humpback Whale PDMP Coordinator was identified after initial drafting of this plan, but is listed in Appendix A. Additionally, as envisioned in the Services' Post-Delisting Monitoring Plan Guidance (USFWS and NMFS 2008), collaborators will be instrumental in implementation (Appendix B).

The role of the Humpback Whale PDMP Coordinator is to:

- Convene the PDMP working group to update the monitoring plan as needed;
- Provide guidance on ESA and MMPA provisions relevant to humpback whales and this monitoring plan to other relevant NMFS staff;
- Distribute the monitoring plan to all NMFS staff and collaborators;
- Prepare interim and final reports;
- Organize meetings as necessary to evaluate and plan monitoring efforts with collaborators;
- Coordinate with NMFS' Permits and Conservation Division regarding permits issued under the MMPA to ensure that monitoring requirements are consistent and that data acquired from related monitoring are provided;
- Publish a Notice of Availability for the interim and final reports in the *Federal Register* and on appropriate web sites;
- Provide copies of interim and final reports to all collaborators;
- Make recommendations based on monitoring results;
- Report each year to collaborators on the status of the species, report new significant information about threats, and report on the implementation of the monitoring plan, including highlighting any significant hurdles to implementation and/or changes in monitoring objectives, methods, or intensity;
- Organize and submit regional budget requests within NMFS, when funding is available;
- Consult and coordinate with the IWC to keep abreast of humpback whale monitoring in the Southern Hemisphere;
- Seek partnerships with other agencies to implement the plan; and
- Coordinate with NMFS regional staff, appropriate states, and others to obtain monitoring data from each region.

The role of regional staff is to:

- Establish or maintain a network of cooperators (external researchers, organizations, and other entities) who monitor humpback whales and threats to their recovery within their Region;

- Work with other regional staff to plan, implement, and/or analyze surveys (when funds are available), and summarize monitoring results in cooperation with States and other cooperators;
- Participate in established regional working group meetings, or establish a regional working group, as necessary, to assist in the planning and implementation of the monitoring surveys;
- Coordinate with tribes on monitoring activities on or near tribal lands;
- Seek or continue partnerships with states, tribes, other governmental agencies and nongovernmental organizations to implement the plan;
- Make recommendations to the Humpback Whale PDMP Coordinator and to the monitoring team during PDMP meetings based on survey and other monitoring results;
- Coordinate the collection and compilation of regional survey results;
- Provide monitoring results to the Humpback Whale PDMP Coordinator for inclusion into the interim and final reports by January 31 each year;
- Ensure that monitoring data are collected using methods that meet the requirements of this monitoring plan, when feasible;
- Determine budget requirements to carry out monitoring in their Region and help secure potential funding, as possible;
- Submit regional funding needs to the Humpback Whale PDMP Coordinator, and assist in distributing funds to the cooperators; and
- Provide information regarding human-related takes (for their region) to the Humpback Whale PDMP Coordinator and provide such information to NMFS personnel preparing the Marine Mammal Stock Assessment Reports for humpback whale stocks.

Population abundance and growth rate estimates are made when and if new data from surveys become available from anywhere throughout the range of the humpback whale. Consequently, the role of the regional staff will be largely to ensure that the plan is executed within their regions, as needed. Regional staff are expected to work with, and will continue to work with collaborators involved in these efforts.

PDMP working group members (Appendix A) and collaborators in other agencies and entities (Appendix B) will, as resources are available, undertake key components of monitoring and will create and maintain a strong and adequate monitoring program.

IV. MONITORING METHODS

During the 10-year post-delisting monitoring period, NMFS will work with collaborators throughout the range of the humpback whale, to the extent possible, to:

- Monitor abundance trends of each humpback whale DPS (counts of calves, juveniles, and adults)
- Update estimates of population growth rates for each humpback whale DPS, as data become available
- Monitor spatial and temporal distribution of different age classes of humpback whales in each DPS
- Monitor and assess potential threats to continued recovery for each humpback whale DPS, including:

- ⇒ Entanglement in fishing gear
- ⇒ Vessel strikes
- ⇒ Disease, parasites, contaminants, biotoxins
- ⇒ Direct takes (whaling, subsistence harvest)
- ⇒ Declines in abundance of important prey
- ⇒ Degradation of marine habitats
- ⇒ Whale watch activities
- ⇒ Underwater noise
- ⇒ Disturbance
- ⇒ Tourism
- ⇒ Predation
- ⇒ Research
- ⇒ Climate change/ocean acidification

A. Abundance Trends

Data will be collected from ongoing whale shipboard and aerial surveys over the next 10 years to make abundance estimates, using photo ID mark-recapture data, for each DPS. The most appropriate abundance estimation method (mark-recapture, minimum population, line transect) will be used, depending on whether model assumptions are met. Other methods may be used if further research and modeling indicates better ways to avoid various biases.

B. Population Growth Rates

While also recognizing resource limitations and constraints, data will be collected from ongoing whale shipboard and aerial surveys (and opportunistically, through whale watching trips, and threat monitoring efforts) over the next 10 years to estimate population growth rate, using photo ID mark-recapture data, for each DPS. The interbirth-interval method (Barlow and Clapham 1997) may be used to estimate reproductive rates, and the modified Jolly-Seber approach (Buckland 1980) may be used to estimate non-calf survival rates, and the resulting estimates of demographic parameters (reproductive rates and non-calf survival rates) may then be used to estimate population growth rate (λ), with standard error calculated using a Monte Carlo approach (Barlow and Clapham 1997). Other methods may be used if further research and modeling indicates better ways to avoid various biases. For example, analytical research may improve our ability to model observed variability in survival rates and birth rates (Clapham et al. 2003).

C. Spatial and Temporal Distribution

Data will be collected from ongoing whale shipboard and aerial surveys (and opportunistically, through whale watching trips, and threat monitoring efforts) over the next 10 years to monitor spatial and temporal distribution of each DPS. For example, for the West Indies DPS, a systematic photo-ID survey of the entire Scotian shelf could help clarify the status and habitat use of humpback whales in this largely unstudied region of the North Atlantic and the relation between this feeding ground and the Gulf of Maine (Clapham et al. 2003).

Recent abundance and population growth estimates, current distribution, and ongoing work

Below are the most recent estimates of abundance and population growth rate, and a description of current distribution (Bettridge et al. 2015) for each DPS. Also included is a summary of

ongoing surveys that can be used to estimate abundance and population growth rates and monitor any changes in spatial and temporal distribution for each DPS.

West Indies DPS ($n=12,000$, $\lambda=2\%$):

The breeding range of the West Indies DPS includes the Atlantic margin of the Antilles from Cuba to northern Venezuela, and its feeding range primarily includes the Gulf of Maine, eastern Canada, and western Greenland. While many West Indies whales also use feeding grounds in the central (Iceland) and eastern (Norway) North Atlantic, many whales from these feeding areas appear to winter in another location.

Extensive work is being done in the Gulf of Maine, and surveys off West Greenland will possibly continue. Also, there is occasional sporadic work elsewhere, but no relevant research in the West Indies.

Hawaii DPS ($n=10,000$, $\lambda=5.5-6\%$):

The Hawaii DPS consists of humpback whales that breed within the main Hawaiian Islands. Whales from this breeding population have been observed in most known feeding grounds in the North Pacific, but about half of the whales from population migrate to Southeast Alaska and Northern British Columbia. They also commonly use northern British Columbia, northern Gulf of Alaska and Bering Sea feeding grounds.

There is ongoing mark-recapture work in Hawai'i and Southeast Alaska, but expansion of spatial coverage would likely be required to provide sufficiently robust data to reliably estimate abundance and trend. A 30-year time series (beginning in 1985) of life history and abundance trend information is available for waters in and near Glacier Bay National Park in southeastern Alaska. The National Park Service intends to continue this work indefinitely, thus this population could be considered a geographically limited but valuable index that informs NMFS of the changing life history traits (calving rate, age at maturity, population trend) of the Hawaii DPS.

Mexico DPS ($n=6,000-7,000$, $\lambda=U$):

The Mexican DPS consists of whales that breed along the Pacific coast of mainland Mexico, the Baja California Peninsula and the Revillagigedo Islands. The Mexican DPS feeds across a broad geographic range from California to the Aleutian Islands, with concentrations in California-Oregon, northern Washington – southern British Columbia, northern and western Gulf of Alaska and Bering Sea feeding grounds.

There is ongoing work in Mexico, but again expanded spatial coverage is probably required.

Brazil DPS ($n=6,400$, $\lambda=7.4\%$):

This DPS consists of whales that breed between 3°S and 23°S in the southwestern Atlantic along the coast of Brazil with a prominent concentration around the Abrolhos Bank (15°-18°S) and feed off South Georgia and the South Sandwich Islands.

Ship surveys were conducted in 2008 and 2012 for abundance, and aerial surveys have been ongoing since the mid 2000s. There will likely be good data to monitor trends for this stock (IWC Breeding Stock A - Western Atlantic Ocean).

Gabon/Southwest Africa DPS ($n=6,600-8,100$, $\lambda=\text{increasing}$):

This DPS consists of whales that breed and calve off central western Africa between $\sim 6^\circ\text{S}$ and $\sim 6^\circ\text{N}$ in the eastern Atlantic, including the coastal regions of northern Angola, Congo, Togo, Gabon, Benin, other coastal countries within the Gulf of Guinea and possibly further north. This DPS is thought to feed offshore of west South Africa and Namibia south of 18°S and in the Southern Ocean beneath west South Africa ($20^\circ\text{W} - 10^\circ\text{E}$).

There is ongoing photo-id work in IWC Breeding Stock B (Eastern Atlantic: B1 - Gabon; B2 - West South Africa); data may be useful for future estimates of trends (but robustness not clear).

Southeast Africa/Madagascar DPS ($n=7,000-7,400$, $\lambda=\text{increasing}$)

The Southeast Africa/ Madagascar DPS includes whales breeding in at least three different areas in the western Indian Ocean: one associated with mainland coastal waters of southeastern Africa, extending from Mozambique to as far north as Tanzania and southern Kenya, a second found in the coastal waters of the northern Mozambique Channel Islands and the southern Seychelles and the third found in the coastal waters of eastern Madagascar. The feeding grounds of this DPS in the Southern Ocean are not well defined but are believed to include multiple localities to the west and east of the region bounded by $5^\circ\text{W} - 60^\circ\text{E}$.

Some ongoing work in IWC Breeding Stock C (Western Indian Ocean: C1 - Mozambique; C3 - Madagascar), but at present, not enough details to assess whether this would provide sufficiently robust data for trend.

West Australia DPS ($n=21,800$, $\lambda=10\%$)

The West Australia DPS consists of the whales whose breeding/wintering range includes the West Australia coast, primarily in the Kimberly Region. Individuals in this population migrate to feeding areas in the Antarctic, primarily between 80°E and 110°E based on tagging data.

Ongoing survey work in IWC Breeding Stock D (Eastern Indian Ocean) aimed at abundance and trend, likely to provide robust data.

East Australia DPS ($n=6,300-7,800$, $\lambda=10.9\%$)

The East Australia DPS consists of the whales' breeding/wintering along the eastern and northeastern Australian coast. Based upon tagging, telemetry, and re-sighting data, individuals in this population migrate to Antarctic feeding areas ranging from 100°E to 180°E , but concentrated mostly between 120°E and 180°E .

Ongoing survey work in IWC Breeding Stock E1 (Western South Pacific) aimed at abundance and trend, likely to provide robust data.

Oceania DPS ($n=3,800$, $\lambda=U$)

The Oceania DPS consists of whales that breed/winter in the South Pacific Islands between ~160°E (west of New Caledonia) to ~120°W (east of French Polynesia), including American Samoa, the Cook Islands, Fiji, French Polynesia, Republic of Kiribati, Nauru, New Caledonia, Norfolk Island, New Zealand, Niue, the Independent State of Samoa, Solomon Islands, Tokelau, Kingdom of Tonga, Tuvalu, Vanuatu, Wallis and Futuna. Individuals in this population are believed to migrate to a largely undescribed Antarctic feeding area.

Ongoing mark-recapture work in IWC Breeding Stocks E2, E3, and F (Central South Pacific), coordinated by the South Pacific Whale Research Consortium in selected locations (New Caledonia, Cook Islands, French Polynesia, occasionally Tonga and elsewhere) aimed at abundance and trend.

Southeastern Pacific DPS ($n=6,500$, $\lambda=\text{increasing}$)

The Southeastern Pacific DPS consists of whales that breed/winter along the Pacific coasts of Panama to northern Peru (9°N-6°S), with the main wintering areas concentrated in Colombia. Feeding grounds for this DPS are thought to be concentrated in the Chilean Magellan Straits and the western Antarctic Peninsula. These cross-equatorial breeders feed in the Southern Ocean during much of the austral summer.

Photo-id work is in progress in IWC Breeding Stock G (Eastern South Pacific), but for this stock effort is typically very localized.

D. Threats

In the Humpback Whale Status Review (Bettridge et al. 2015), the BRT reviewed each of the ESA section 4(a)(1) factors (threats) and concluded that there are no current or known threats that contribute significantly to the extinction risk of these DPSs of humpback whale. NMFS agreed with the BRT's conclusions and determined that none of these threats are causing these DPSs to be in danger of extinction or likely to become so within the foreseeable future throughout all or a significant portion of their ranges. The ESA section 4(a)(1) factors are:

- A. Present or threatened destruction, modification, or curtailment of its habitat or range;
- B. Overutilization for commercial, recreational, scientific, or educational purposes;
- C. Disease or predation;
- D. Inadequacy of existing regulatory mechanisms; and
- E. Other natural or manmade factors affecting its continued existence.

During the monitoring period, NMFS will continue to collect information about potential and residual threats to aid in the understanding of population response in the event that either the abundance or trend of any of these humpback whale DPSs changes. In the context of PDM, USFWS and NMFS (2008:2-2) defined residual threats as "...threats that, collectively, are sufficiently reduced and contained that the species no longer meets the definition of threatened or endangered." These threats can, however, still have adverse effects on humpback whales. NMFS will:

- Annually tabulate and monitor for unusual mortality events, other strandings, and entanglements via marine mammal stranding networks and research activities, including events caused by impacts from fishing gear, vessel strikes, disease outbreaks, etc. This will be done by NMFS in conjunction with our partners in the States, foreign countries, other federal agencies, and through cooperation, consultation and communication with the various coastal tribes and Alaska Native organizations, The Marine Mammal Center (TMMC), Sausalito, California, and other members of the stranding network. Marine Mammal Stranding Networks within the range of the West Indies, Hawaii, and Mexico DPSs are coordinated through the NMFS Greater Atlantic, Pacific Islands, West Coast, and Alaska Regional Offices. Data on entanglement in fishing gear (e.g., net fragments, trolling gear, longline gear) will be collected by NMFS, NOS, ADFG, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, ADFG, Tribes, and others during surveys and opportunistically. Samples will be collected from carcasses for testing for disease agents, contaminants, health, age, and diet, as resources and the condition of the carcass permit. As possible, necropsies will be performed on humpback whales that are found dead to determine, if feasible, a cause of death. This monitoring directly addresses ESA section 4(a)(1) factors A, B, C, and E.
- Monitor entanglement and vessel strikes from fisheries and aquaculture operations.-- NMFS will undertake monitoring through fishery observer programs and through the Marine Mammal Authorization Program (MMAP) for commercial fisheries without observer programs. Monitoring will also be accomplished in conjunction with our partners in the States and Canada's Department of Fisheries and Oceans (DFO) through fishery observer and other programs. Tribal fisheries operate on the northern Washington coast and Strait of Juan de Fuca under treaty rights, and are exempt from observer programs. The Makah Indian Tribe is committed to monitoring tribal fisheries and support for National Marine Mammal Laboratory and tribal partnerships to monitor these fisheries should continue. This monitoring directly addresses section 4(a)(1) factors B, D, and E.
- Monitor for disease, contaminants, and health.--NMFS, in collaboration with partners in the States, other countries, universities and other research and animal response entities (e.g., the North Pacific Marine Mammal Consortium, Southern Hemisphere Consortium, The Hawaii Marine Mammal Center, National Institute of Standards and Technology, etc.), other agencies, and various tribes and Alaska Native organizations, will regularly (4 times during the 10-year monitoring period) tabulate documented incidences of disease, contaminants and ill health in the humpback whale DPSs. Body condition should be assessed during health assessments at all age classes.
- Contingent on funding availability, NMFS will conduct sampling for key contaminants (especially those with known potential to affect reproduction, immune system function, or survival), disease agents, and health indices, at or near the time of the final determination (to establish a baseline), again in 2021, and at the end of the monitoring period in 2026. The priorities for this sampling in each state will be developed by the NMFS Regional staff, in consultation with their regional collaborators and the Humpback Whale PDMP Coordinator. However, at a minimum, a standard disease panel should be run as well as testing for emerging diseases. The stranding network, the Marine Mammal

Center, and NMFS (NWFSC, other science centers) will provide information on any possible influence of harmful algal bloom toxins, novel diseases, and other noteworthy findings from stranded humpback whales in their area. Ideally, samples from stranded animals and subsistence harvested animals will be used in this monitoring effort. This directly addresses section 4(a)(1) factors C and E.

- Monitor subsistence harvest--NMFS will monitor subsistence harvest in Greenland and St. Vincent and Grenadines. This monitoring directly addresses section 4(a)(1) factors B, D, and E.
- Monitor the abundance, distribution and protection of important prey species, as possible, including prey removal levels in humpback whale feeding areas. As the humpback whale DPSs continue to increase in abundance, they may reach and/or possibly exceed carrying capacity in certain locations and nutritional stress could affect population dynamics. Alternatively, nutritional stress could develop due to competition with fisheries, effects of climate change, etc. Data are lacking for most locations for humpback whale prey species that are not commercially harvested. However, as some humpback whale prey species are harvested in commercial and recreational fisheries, the abundance and overall health of the related fish stocks are already monitored by NMFS, state, DFO, or tribal entities, and allowable and actual harvest levels are also, in some cases, set and/or monitored by these entities. At least every 3 years during this 10-year period, beginning in 2018, NMFS will review and summarize available reports on the abundance, health, and harvest levels of the primary humpback whale prey species throughout the range of each DPS. This directly addresses section 4(a)(1) factor A.
- Monitor human activities near breeding and feeding areas.--At least every 3 years during this 10-year period, NMFS will query partners, and review available documents, to determine the current and projected levels of human activities (e.g., noise, oil exploration, vessel traffic, pollution, whalewatching) near breeding and feeding areas of the DPSs not proposed for listing. This directly addresses section 4(a)(1) factor A.
- Monitor impacts of research activities.--This will be done by NMFS in conjunction with our collaborators in other countries, the States, the tribes, and other research entities. The Humpback Whale PDMP Coordinator will, on a triennial basis, review and synthesize information from permit reports submitted by humpback whale research permittees to the permit office to evaluate the overall levels of death, injury, and behavioral harassment that results from all research on humpback whale DPSs. This information will be summarized in the annual report. NMFS will determine if there are steps that need to be taken to reduce the overall level of research take. This directly addresses section 4(a)(1) factors B and D.
- Monitor the emerging potential threat of climate warming and ocean acidification--NMFS recognizes that climate warming and ocean acidification potentially pose long-term threats to humpback whales, but acknowledges that at the time of our proposed revision of the listing status, the likely impacts were uncertain both with respect to magnitude and kind. As part of post-delisting monitoring, NMFS will, in collaboration with regional collaborators and other interested entities, review midway through this

monitoring period (2026) the data gathered through stranding networks from live and dead whales to assess trends in body condition and health assessment. In addition, recent literature and other information will be reviewed on the known impacts of climate warming and ocean acidification on humpback whale prey species and associated marine ecosystems throughout the range of these DPSs to determine whether the best available information indicates directed studies or monitoring are needed and to determine whether information indicates that the threat from these factors is fundamentally different in kind or magnitude than known at the time of our final determination. This directly addresses section 4(a)(1) factors A and E.

V. DATA EVALUATION

A. Review of Monitoring Data Relative to ‘Response Triggers’

NMFS will, in cooperation with states and other collaborators, evaluate the monitoring results to determine whether a more detailed analysis of the status of humpback whale DPSs not listed, changes to the monitoring protocol, or both, is necessary. After each monitoring period, Regional Coordinators will work with the States, and other collaborators as appropriate, to compile the monitoring results for their respective monitoring region, evaluate the results, and prepare a written assessment. This assessment will include a summary of the monitoring data, state whether any of the “response triggers” shown below have been reached, determine whether the data collection protocols are functioning as anticipated or whether any changes are needed, and include an initial determination of any threats that may warrant further evaluation. In addition, NMFS will analyze and summarize regional data it receives from States and other cooperators in the years between formal surveys.

In response to any issues that are cause for concern, NMFS in cooperation with appropriate states will convene a team of experts who could decide to:

- Increase the sensitivity of the status and trend monitoring protocol to detect DPS-wide or regional declines in any of the parameters by, for example, increasing survey frequency;
- Design research that would determine causes of changes in population trend, or declines in calf production or vital rates;
- Work with States, tribes, or other entities to exercise their regulatory authorities to alleviate known or suspected threats;
- Use existing regulatory authorities under the MMPA to protect the species and/or its habitat;
- Extend the PDM period;
- Conduct regional or DPS-wide status assessment(s) to evaluate the significance of threats to humpback whale DPSs; or
- Evaluate whether to initiate a new status review under the ESA to determine if any of the humpback whale DPSs are threatened or endangered under the ESA.

In response to evidence that a DPS is approaching environmental carrying capacity, NMFS in cooperation with appropriate states will convene a team of experts to determine if it is appropriate to terminate PDM for that DPS.

B. Response Triggers

The “response triggers” listed below will, in addition to other factors described above, prompt additional evaluation and appropriate response by the NMFS team of coordinators and collaborators (Appendix A), in consultation with Regional Collaborators (Appendix B) and international, national or regional experts, as necessary. A trigger will prompt NMFS in cooperation with appropriate states to convene a team of experts to do a more detailed review of existing information, which may lead the team of experts to recommend intensifying PDM, initiating a new status review, proceeding with an emergency listing, or terminating PDM (of course, PDM will not be terminated in less than 5 years from initiation). The NMFS team of coordinators and collaborators will evaluate these triggers within each monitoring region and for all regions combined at the end of the 10-year monitoring period and at more frequent intervals as data become available in an effort to determine the status of each DPS.

Abundance trends, population growth rates, spatial and temporal distribution, and threats monitoring will be assessed in an integrated manner to discern whether a decrease in population growth rate, for example, is a sign of population decline or approaching carrying capacity. For example, if abundance is declining, this could be a cause for concern. If, however, abundance is holding steady while population growth rate is declining, this could indicate that the DPS is at or is approaching carrying capacity, or has increased in population size beyond carrying capacity and the declining population growth rate could be a result of density-dependent factors. Temporary declines in calf production, juvenile survival, or both, in one season or more than one season, can occur in response to environmental conditions (e.g., El Niño-Southern Oscillation events). There could be a natural reduction in productivity, a decline in population growth rate, or increasing intra-specific competition as a population approaches carrying capacity (Clapham et al. 2003). Also, if there is top down forcing (e.g., predation, ship strikes), we may see an increase in per capita calf production while the overall population declines. Evidence of a decline in body condition of stranded whales, with malnourished animals indicating potential for food limitation, could be indicative of approaching, reaching, or exceeding carrying capacity. Or, it could indicate a reduction in prey availability or a response to pollutants or toxins. Should declines be noted, available information on natural causes and anthropogenic factors will be evaluated. If, after a trigger is reached, and the team of experts that NMFS consults decides that a new status review is appropriate, any relisting decision would be made by evaluating the status of the each humpback whale DPS relative to the ESA’s five section 4(a)(1) factors.

Response triggers

Triggers that may indicate a need to intensify PDM, initiate a new status review, or proceed with a rulemaking (normal, or emergency basis) to list a DPS

- Any significant decline in abundance or range
- A decline in birth or survival rates of humpback whale individuals (beyond what would be expected as populations approach their natural carrying capacity) based on marked animal studies in the areas where these surveys occur, or new estimates of birth rate which indicate that individuals from any humpback whale DPSs are responding to a new threat or an increase in a previously identified threat;
- Evidence suggesting or indicating decrease in non-calf numbers and/or a decline in birth or survival rates (beyond what would be expected as populations approach their natural carrying capacity) is occurring in any humpback whale DPSs;

- Contraction of spatial distribution or change in temporal distribution for any humpback whale DPS;
- Results from threats monitoring that indicate that a new threat has emerged, the magnitude of an existing threat has increased, and/or that the cumulative impacts from threats is likely greater than previously understood, such that it (they) may pose a threat to local or range-wide reproduction or survival of any humpback whale DPSs; or
- Evidence of a decline in a significant health factor (e.g., body condition, disease), beyond what would be expected as populations approach their natural carrying capacity, of any category of humpback whale (i.e., age group, sex, reproductive status) or a significant change in behavior that could be attributed to a decline in health (e.g., habitat abandonment, changes in reproductive behavior, etc.).

Triggers that may indicate it is time to terminate PDM

- An increase in the estimated rate of survival or new estimates of birth rate which indicate that individuals from any humpback whale DPSs are not being negatively impacted by new threats or an increase in a previously identified threat;
- Evidence suggesting or indicating an increase in non-calf numbers, and/or high reproductive rate is occurring in any humpback whale DPSs;
- Maintenance or expansion of spatial distribution;
- Results from threats monitoring that indicate that no new threats have emerged or the strength of any existing threat has not increased; or
- Evidence of an improvement in a significant health factor of any category of humpback whale.

VI. REPORTS

Under Section 117 of the MMPA, NMFS is required to update Marine Mammal Stock Assessment Reports (SARs) every three years or when new information becomes available, for non-strategic stocks. If the review shows that the status of the stock has changed or can be assessed more accurately, NMFS revises the report in consultation with the relevant Scientific Review Group and after public review and comment. The SARs for the Gulf of Maine, American Samoa, California/Oregon/Washington, and Central North Pacific stocks of humpback whale will continue to provide information regarding: a description of the stock's geographic range; a "minimum population estimate"; current population trends; current and maximum net productivity rates, "Potential Biological Removal" (PBR) levels; status of the stock; and estimates of annual human-caused mortality and serious injury by source. As noted above under **B. Humpback Whale Protection and Monitoring under the MMPA and other Laws**, NMFS may reconsider the boundaries of these MMPA stocks to determine whether it is prudent to align them with the DPS boundaries of humpback whales that occur in U.S. waters. And while the Western North Pacific DPS is proposed for listing as threatened under the ESA and therefore not subject to this PDMP, the MMPA Western North Pacific stock will continue to be monitored, providing useful data for future assessments.

For DPSs that occur in waters outside the jurisdiction of the United States (Brazil, Gabon/Southwest Africa, Southeast Africa/Madagascar, West Australia, East Australia, Oceania, and Southeastern Pacific DPSs), NMFS will coordinate with the IWC, foreign nations, and other entities in an effort to obtain data to monitor their status.

As noted in the Post-Delisting Monitoring Plan Guidance (USFWS and NMFS 2008:4-3):

“Effective PDM requires timely evaluation of data and responsiveness to observed trends. PDM data should be assessed at pre-determined intervals to determine whether the data collection protocols are functioning as anticipated and whether any changes in species protection are needed.”

Therefore, NMFS will issue a report consolidating and evaluating the data every 3 years within the 10-year timeframe, beginning in 2018. NMFS will use the SARs to continue an annual reporting cycle on existing abundance data. The PDMP Coordinator will work with regional staff and regional collaborators to develop details on standard content of these reports, as well as timing for posting them on the NMFS HQ website. Reports will also suggest ways to improve sampling protocols or other aspects of the plan design if necessary. NMFS is sensitive to investigator concerns about ensuring reports do not preclude publication of findings in peer review literature and these reports will not do so.

If changes in population counts of any humpback whale DPSs or threat magnitudes become large enough to cause concern to the PDMP Coordinator and collaborators (Appendix A) or if concerns are raised by NMFS Collaborators (Appendix B), then NMFS will consult with all regional collaborators, after receiving input from a team of experts that NMFS convenes, and consider taking action as appropriate.

At the end of the 10-year monitoring period, NMFS will prepare a final monitoring report that summarizes monitoring results and provides a final conclusion with regard to the following potential outcomes, as outlined in the PDMP guidance (USFWS and NMFS 2008:4.3):

- *PDM indicates that the species remains secure without ESA protections.* If the species appears to remain secure (e.g., its extinction risk has remained low, its demographic characteristics remain healthy, no population-level threats have emerged, and the species does not meet the definition of either a threatened or an endangered species), conclusion of PDM is appropriate. However, as noted in the PDMP guidance (USFWS and NMFS 2008), there may be circumstances in which monitoring will continue, even after PDM is concluded, regardless of the PDM outcome. This is the case for humpback whale DPSs that occur in U.S. waters, which, under various provisions of the Marine Mammal Protection Act, will continue to be monitored following the PDM period and their stock status will be reported regularly in Marine Mammal Stock Assessment Reports.
- *PDM indicates that the species may be less secure than anticipated at the time of delisting, but information does not indicate that the species meets the definition of threatened or endangered.* Conditions that may indicate that the species could be less secure than anticipated at the time of delisting include, but are not limited to: if the level of residual threats has increased; new population-level threats are emerging; information indicates that population performance is not as good as it was at the time of delisting; and/or the population has begun to decline (but not at a rate that would indicate the listing of the species may be warranted). At a minimum, the duration of the PDM period will be extended. Depending on specific circumstances, it may be appropriate to intensify PDM (e.g., by adding parameters or by increasing the frequency of sampling) to increase the

probability of detecting any future declines. It may be appropriate to initiate programs to determine the causes of unanticipated declines and/or implement additional conservation measures under existing regulatory authorities (other than the ESA).

- *PDM yields substantial information indicating threats are causing a decline in any of the humpback whale DPS' status since delisting, such that listing the DPS as threatened or endangered may be warranted.* In this instance, following the guidance in USFWS and NMFS (2008), and in addition to activities discussed in the previous paragraph, NMFS would initiate a formal status review to: assess changes in threats to those DPSs; assess changes in their abundances, productivity, survival, and distribution; and determine whether relisting is appropriate.
- *PDM documents a decline in the species' probability of persistence, such that the species once again meets the definition of a threatened or endangered species under the Act.* As indicated in the PDMP guidance, in the event that PDM reveals that any of the humpback whale DPSs again meet the definition of a threatened (i.e., likely to become endangered in the foreseeable future throughout all or a significant portion of its range) or endangered species, then NMFS would take steps to promptly propose the species for relisting under the ESA in accordance with procedures in section 4(b)(5). Likewise, if the best available information indicates an emergency that poses a significant risk to the well-being of this species, NMFS would exercise its emergency listing authority under section 4(b)(7) accordingly.

NMFS will publish a notice of availability of the final monitoring report in the *Federal Register*.

VII. FUNDING

Post-delisting monitoring is a cooperative effort between: NMFS; other Federal agencies; State, tribal, and foreign governments; intergovernmental organizations (e.g., IWC); and non-governmental partners. Funding of post-delisting monitoring presents a challenge for all partners committed to ensuring the continued viability of humpback whales following removal of ESA protections. To the extent feasible, NMFS intends to budget for post-delisting monitoring efforts through the annual appropriations process. Nonetheless, nothing in this PDMP should be construed as a commitment or requirement that any Federal agency will obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation.

VIII. ACKNOWLEDGMENTS

This monitoring plan was developed by NMFS in cooperation with the Hawaii Department of Land and Natural Resources, Alaska Department of Fish and Game, Massachusetts Division of Marine Fisheries, Glacier Bay National Park and Preserve, and the Hawaiian Islands Humpback Whale National Marine Sanctuary. NMFS HQ staff will revise the plan following public and peer review comment and finalize it following review and input by a team of staff from other NMFS offices and from regional collaborators.

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